

Hitachi Research Institute Report

Digital Transformation of SMEs for the Age of Society 5.0

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Initiatives to prepare for the fourth industrial revolution are spreading around the world. Leading nations¹ are expanding measures that encourage SMEs to utilize IT, recognizing how vital it is to accomplish the digital transformation of small and medium-sized enterprises (SMEs), as the underpin of socioeconomic infrastructure. In Japan, the government has been taking a variety of supports aimed at introducing productivity-enhancing software and cloud services to nearly 1 million SMEs (equivalent to 30% of total SMEs) in the last three years by the end of 2020².

As the “driving force of the Japanese economy” and “a central player of society to make contributions to their communities and the life of their inhabitants”,³ SMEs play a significant role in realizing Society 5.0, in which social challenges can be resolved while sustaining economic development through the sophisticated integration of cyber-physical spaces.

From January through March 2019, Hitachi Research Institute surveyed IT utilization and the challenges facing medium-sized manufacturing companies (50 - 299 employees), which are considered to be committed to more advanced digitalization efforts compared with other SMEs. Based on the survey results, this report deals with the challenges and the measures needed to solve them while promoting the digital transformation of SMEs to prepare for the oncoming age of Society 5.0.

1. SMEs Digital Transformation for the Age of Society 5.0

1.1 Expanding utilization of digital technology

Digital technology evolution enables various information from corporate activities to be digitally recorded, gathered, transmitted instantly, analyzed and used for different purposes, at a dramatically lower cost (expenses, time, and labor) than before.

The price of IoT devices has fallen to about a quarter in the last 15 years⁴, while the price of cloud services has dropped by half every three years⁵. The dramatic reduction in digital technology costs has brought changes to cost-conscious SMEs, whose management resources are limited, in the following two aspects: For one thing, they have a greater potential for using digital technology which didn't do because of the high expense. For another, they also have a greater potential for using external management resources through digital network built with external companies.

1.2 Digital data flows in Society 5.0

In Society 5.0, production site and corporate management information will be further digitalized through the application of FA (factory automation)/robots and the evolution of edge computing. This continual circulation of digital data within companies, and between external customers and suppliers, creates “digital data flows.” As a result, regardless of the size of the company, the potential for dramatic improvements in management efficiency, utilization of external management resources in terms of personnel, facilities, technologies, and expansion of the customer base beyond existing market constraints should grow.

There are two types of digital data flows in a company (see Figure 1): “supply chain management” data flow of materials and money, not only in a company but also in a supply chain including customers and suppliers; and “production management” data flow based on real-time status capacity utilization, personnel, raw materials, half-finished goods, finished goods, etc. at a production site. Establishing these two digital data flows intra- and inter-company, as well as in the entire supply chain, should lead to minimized transaction costs and the optimal allocation of management resources, which have been unevenly distributed to large corporations, in the overall economic society.

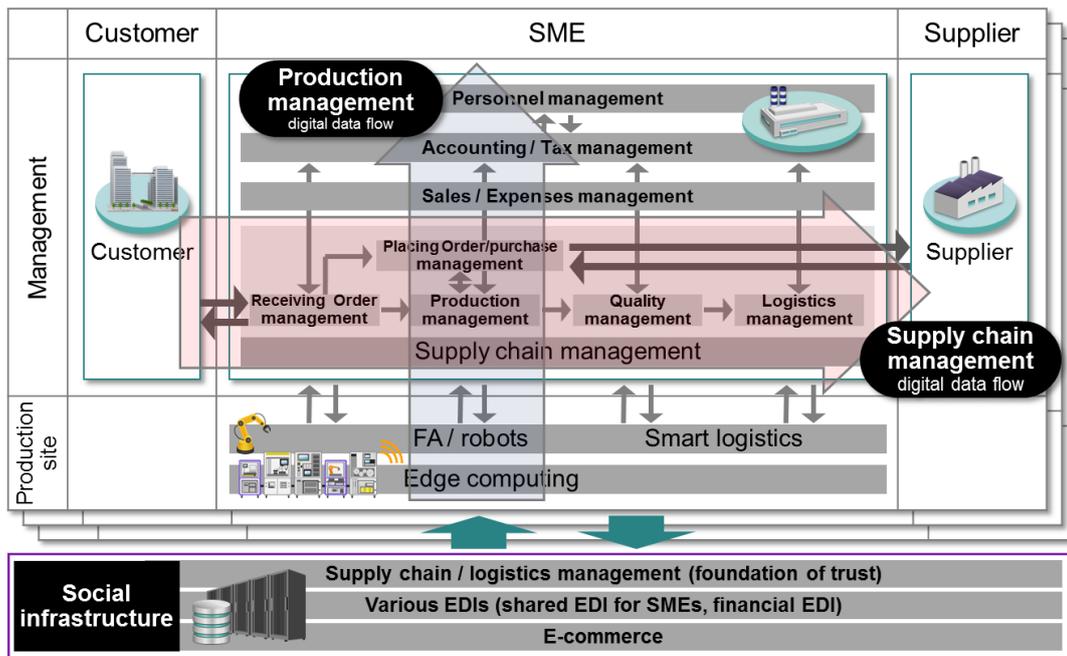
¹ According to a May 2017 report by the European Commission, among the EU countries that began tackling the fourth industrial revolution at an early stage, Germany, Italy, Sweden, France, and Spain are implementing policies with particular focus on SMEs.

² New Economic Policy Package (Cabinet Decision, December 8, 2017)

³ Small and Medium Enterprise Charter (Cabinet Decision, June 18, 2010)

⁴ Estimates by Goldman Sachs BI Intelligence.

⁵ “Bezos’s law” proposed in 2014 by Greg O’Connor, CEO of AppZero.



Source: Hitachi Research Institute

Figure 1: Digital Data Flows in Future

In order to realize them, companies (including SMEs) constituting a supply chain need to establish digital data flows throughout the entire economic society, by making digital records of information about management resources and business process (i.e., digitalization), and by transmitting their records to external companies digitally (i.e., digital connection). If any of the SMEs in a supply chain has non-digital data, this creates a mix of digital and analog data in the chain, leaving its inefficiency unresolved.

2. Challenges in Intra- and Inter-Companies' Digital Data Flows

2.1 Surveys on digital data flows

According to previous surveys on IT utilization by SMEs⁶, IT systems⁷ were introduced by medium-sized companies with 101 - 300 employees for accounting & finance/payrolls (70 - 90% of companies), order/logistics management (about 30%), and production management (20 - 30%).

These previous surveys, however, cover only hardware or software implementation, while the range of data digitalized/controlled in each business process, how digital

data is used and connected between intra- and inter-companies is left unclear. To find out about the actual situation regarding data flows at SMEs, we surveyed the digitalization of in-company business processes and the digital connection between intra- and inter-companies.

We conducted a survey of medium-sized manufacturing companies (with 50 - 299 employees), which are considered to be further ahead in digitalization among SMEs, on the current state of digitalized information related to the following operations: (1) supply chain management (receiving order management, placing order /purchase management, production management, and logistics management); (2) sales/expenses management; (3) accounting/tax management; and (4) personnel management.

Employing the structured interview method for the survey, which enables quantitative comprehension and a hearing of actual conditions of their efforts with common questionnaire forms, we called in 74 companies⁸ across Japan from January through March 2019 and had an interview with their executives or staff in charge of IT systems.

The results are described below.

⁶ Tokyo Chamber of Commerce and Industry (2017), "Survey of Productivity Improvements / ICT Utilization"; Information-Technology Promotion Agency (2017), "Survey of Actual IT Security Measures by SMEs in 2016"

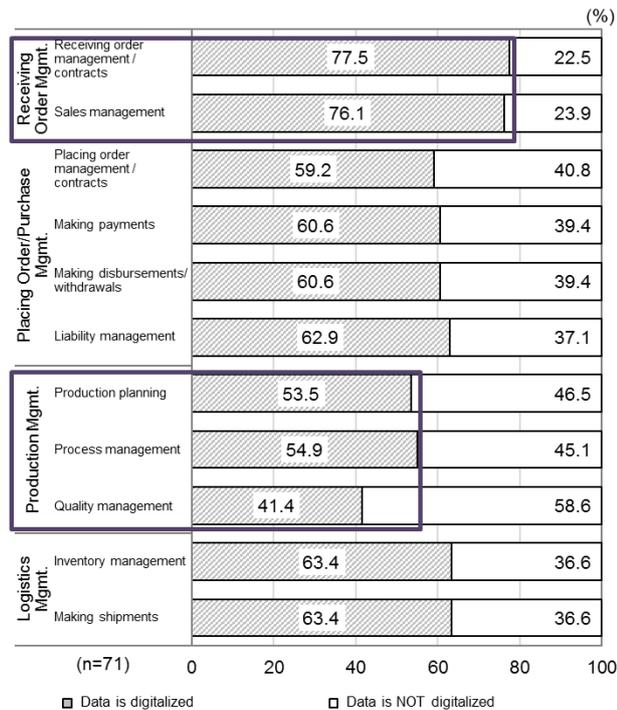
⁷ "IT system" herein refers to a system which processes and transmits information by using hardware, software, networks, databases, or a combination of any of them.

⁸ Among those listed in the "2016 Economic Census for Business Activity: Manufacturing (Industrial Districts)" published by the Ministry of Internal Affairs and Communications and the Ministry of Economy, Trade and

Industry (233 districts nationwide), we chose 10 industrial districts where the percentage of SMEs in all companies is greater than the national average and which are ranked high both on product shipment per establishment and on added value per employee. We randomly picked medium-sized manufacturing companies of 50 to 299 employees based in these districts. We approached a total of 74 companies for interview, aiming to secure 10 companies from each district and 100 companies in total. Valid responses were compiled from 71 companies, excluding three companies where the number of employees recently decreased to under 50.

2.2 Production management is lagging digitalization

A high percentage, nearly 80%, of the companies have digitalized “receiving order management” information such as order contracts and sales management (Figure 2). This is because receiving order management operations are more formalized through a direct link to sales/expenses management and accounting/tax management operations, which are essential (to corporate management) regardless of the type of business or the size of the company.

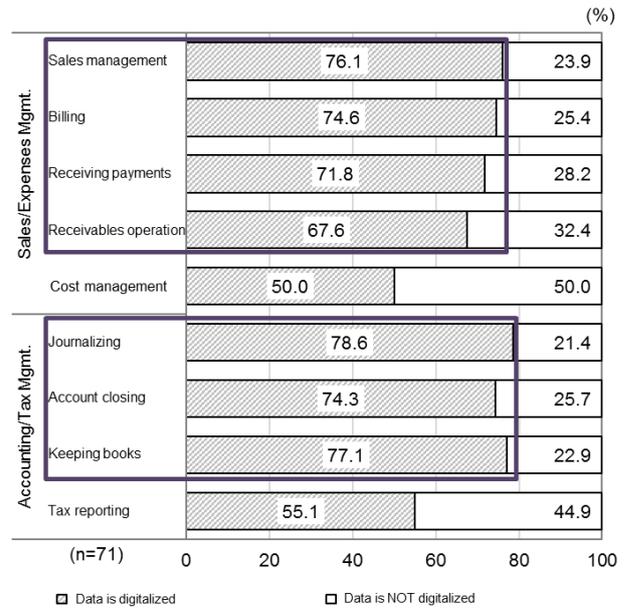


Note: The digitalization of data refers to the handling of a part or all of the information related to the relevant business process on an IT system. Companies that answered “using office software” are regarded as “NOT digitalized.”

Source: Hitachi Research Institute Survey

Figure 2: Digitalization in Supply Chain Management (% of Companies)

Roughly 70 - 80% of the companies have digitalized information related to “sales/expenses management” such as the processes of billing, receiving payments, and receivables as well as related to “accounting/tax management” such as the processes of journalizing and account closing (Figure 3). Regardless of the type of business or the size of the company, fund flows management is fundamental to corporate management where a higher percentage of SMEs have digitalized their data.



Note: See the note on Figure 2.

Source: Hitachi Research Institute Survey

Figure 3 Digitalization in Sales/Expenses Management & Accounting/Tax Management (% of Companies)

On the other hand, only half of companies have digitalized information about “production management” such as the processes of production planning, process management, and quality management (Figure 2). In production management operations, irregular processes are needed quite frequently, and thus office software, which can be easily modified by staff in charge, is widely used. At a production site, actual numbers are quickly written down by hand in print-out journals and later inputted into systems upon completion of production in many cases. Roughly 30 - 40% of companies have also implemented an in-house or custom-developed IT system for production management operations.

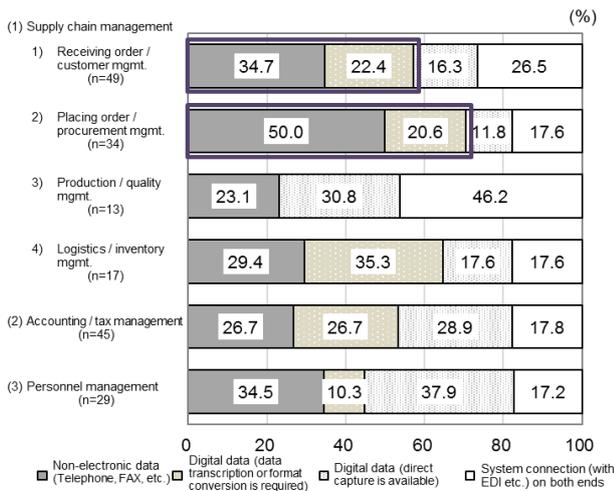
Looking ahead, the application of FA/robots and edge computing is expected to be further promoted, which should dramatically streamline production sites. So the digitalization of data in production site is a pressing matter.

2.3 B2B order processes are still analog

In many companies, order information has been digital recorded internally. However, one third of companies receive orders from customers and half place orders with suppliers by telephone/FAX. Including cases where a company’s own IT system cannot retrieve data automatically due to data transcription or format conversion work, 60 - 70% of companies don’t have a digital connection in which digitalized data is ready for instant use (Figure 4).

Even at companies whose systems are connected through EDI to customers or suppliers with large transaction volumes, EDI is used only for repeat orders of products. There is limited use of EDI with other companies. Analog data is still widely used in order operations, which creates extra workloads, such as manual inputting of data into companies’ own systems. To resolve this situation, both

suppliers and demanders on the same supply chain should review the existing order process, motivate staff and develop an environment to promote digital data connections.



Note: Non-replies and companies with “no information exchanges” are excluded.

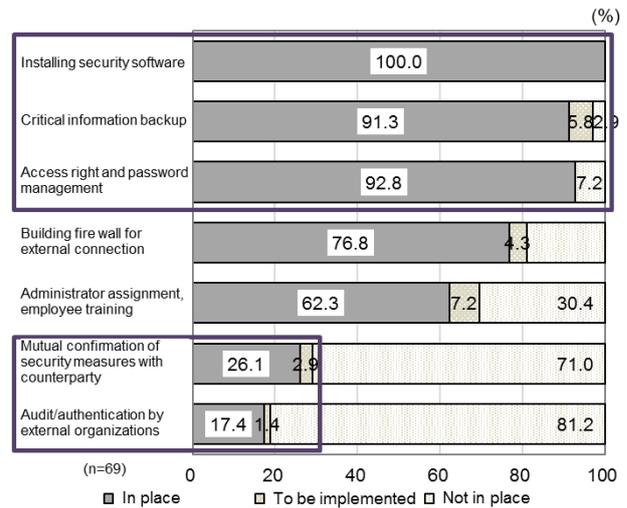
Source: Hitachi Research Institute Survey

Figure 4: B2B Communication

2.4 Supply chain digital security is weak

More than 90% of companies have installed security software in their individual equipment (PCs etc.) and intranetworks, and taken measures such as backups of critical information, access right and password management. Conversely, 30% of companies conduct a mutual confirmation of security measures with their customers/counterparties, and only 20% are audited or authenticated by external organizations (Figure 5). When asked by their customers/counterparties about security measures, many companies only perform paper-based checks. Thus, there are still many weaknesses in the cyber security measures taken by SMEs.

In order to prevent damage from cyber-attacks on SMEs spreading to the entire supply chain, a structure must be established to secure and guarantee the reliability of products/services provided to, or data exchanged with customers/counterparties.



Source: Hitachi Research Institute Survey

Figure 5: Efforts to Ensure Digital Security

3. Measures for digital transformation of SMEs

3.1 Government support needs to be reviewed

The government has offered support for SMEs to introduce hardware, software, and cloud services through a variety of measures. Its goal is currently to provide support to approximately 1 million SMEs. Nevertheless, nearly 20 to 30% of SMEs are still hesitant due to lack of IT staff and investment funds, and this situation hasn't changed since a previous survey conducted 20 years ago^{9,10}. The existing support needs to be reviewed as there is a limit to the number of companies eligible for said support, as well as to its benefits, due to financial constraints.

In this case, we should go back to the basics of SME policy, “(to) encourage the SMEs that are self-reliant,”¹¹ and develop an environment for SMEs to assess returns worthy of the risk/cost (expenses/labor) they take in their IT investments, before making investment decisions voluntarily. To this end, it is vital to enhance the hardware, software, and cloud service options suitable for better SMEs management and available at a lower cost even to those with limited expertise, as well as to develop infrastructure for establishing digital data flows throughout the economy and society.

⁹ Small and Medium Enterprises Agency, “Survey of Actual Corporate Creative Activity” (December 1999) Published in White Paper on Small and Medium Enterprises in Japan (2000 Edition).

¹⁰ Mitsubishi UFJ Research and Consulting Co., Ltd., “Survey

on Productivity Enhancement Initiatives to Prepare for Labor Shortage” (December 2017) Published in White Paper on Small and Medium Enterprises in Japan (2018 Edition).

¹¹ Small and Medium Enterprise Charter (Cabinet Decision, June 18, 2010)

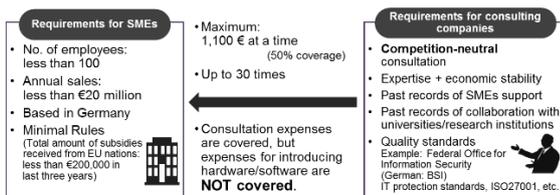
3.2 Business process re-engineering at the heart of digital transformation

Each individual company should prioritize reviewing all its business processes (receiving order management, placing order/purchase management, production management, quality management, and logistics management) in a supply chain which connect the company to its customers or suppliers, with a view to establishing digital data flows. According to previous surveys¹², many of the SMEs that achieved higher labor productivity through IT implementation take “business process re-engineering” processes in place. Reviewing business processes for digitalization opens the door to considering how efficient business should be, leading to a boost in the effective management of IT resources.

The Go-Digital Subsidy program, launched in 2017 by the Federal Ministry for Economic Affairs and Energy of Germany (BMWi), offers financial support for SMEs to take advantage of external consulting services for the purpose of reviewing their business processes, as well as digitalization and identification of issues (Figure 6). Independent consultants who provide services for SMEs are required to ensure competitive neutrality under a registration system, on the condition of non-preferential treatment on IT implementation. Expenses for introducing hardware/software are not eligible for this program. SMEs eligible for the subsidy are allowed to receive consulting services up to 30 times, but must make IT investments based on their own discretion.

Go-Digital Subsidies (since Oct 2017)

- Consultation expenses for identifying issues in the following three areas “before” introducing IT (hardware, software, and cloud services) are subsidized:
 - 1) Business process digitalization Digitalizing workflows, etc.
 - 2) Digital market exploitation Planning online marketing strategies, etc.
 - 3) IT security measures Preventing or minimizing damage from cyber crime, etc.
- Ab. 700 IT consulting companies across Japan are registered (as of April 2019)
- Ab. 200 new applications are filed every month (as of April 2019)



Source: Created by Hitachi Research Institute based on the project outline and others.

Figure 6: Business Process Re-engineering at the heart of Digital Transformation: Germany’s Go-Digital Subsidy

In Japan, we need to take some measures to support SMEs committed to their business transformation through the combination of business process reviews and establishing digital data flows, so that they can achieve their investment results at a lower cost.

¹² White Paper on Small and Medium Enterprises in Japan (2018 Edition), pp.233-4 Original source: Mitsubishi UFJ Research and Consulting Co., Ltd., “Survey on Productivity

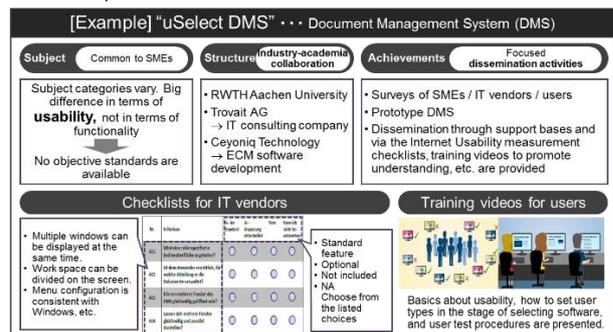
3.3 Development of Usable IT Systems

To promote digital data utilization at SMEs production sites where staff with IT expertise is limited, we need to secure the option of more user-friendly hardware, software, and cloud services. Usability should be key to furthering advanced application of FA/robots and edge computing in the near future, in addition to functionality and reliability.

In the Usability - Einfach Intuitiv project, launched in 2012 by BMWi Germany, industry-academia collaboration teams are formed to evaluate various software provided by IT vendors for business purposes such as 3D modeling and documentation control, in terms of usability for SMEs -- whether SMEs can use them easily (Einfach) and intuitively (Intuitiv) (Figure 7). In addition, a wide range of promotion activities are conducted under the project. For example, manuals and checklists are created for distribution based on the evaluation results, so that SMEs can select the software suitable for their objectives, and workshops are also held.

Usability - Einfach Intuitiv (since 2012; 17 projects)

- Industry and academia jointly evaluate business software provided by IT vendors
- Usability evaluations/criteria easy to understand for less-experienced/knowledgeable SMEs are set and disseminated to IT vendors and user companies



Source: Created by Hitachi Research Institute based on the final uSelectDMS report.

Figure 7: Development of Usable IT Systems: Germany’s “Usability - Einfach Intuitiv” Project

In Japan, we could also build a structure to provide objective assessments by setting a marketplace function where IT vendors’ capabilities and actual records of their product software/cloud services are evaluated by IT experts, support staffs, users, etc. from SMEs’ perspectives, and make the information available for viewing.

3.4 Streamlining of analog processes

In Japan’s economic and society, paper-based communication still exists as standard practice in a wide range of business scenes, such as end of month settlements, contract forms, delivery statements, bills and receipts, in addition to placing/receiving orders by telephone/FAX. Furthermore,

Enhancement Initiatives to Prepare for Labor Shortage” (December 2017)

some processes are still done manually, such as putting seals/stamps on contract forms and receipts. In order to streamline these business practices, efforts by individual companies and industries are not enough; there must be a whole scale change in society's systems and structures.

If the Digital Procedure Bill¹³ submitted to the ordinary Diet session in 2019 is enacted, general administrative procedures will go online, with administrative civil procedures becoming a one-stop process and procedures based on laws and regulations going online. At the same time, in an effort to achieve "future-oriented trade practices" (so-called "Sekoh Plan," named after responsible minister), both suppliers and demanders should review and address interruptions to digital data flows, caused by continued use of telephone/FAX for B2B ordering, seals/stamps for certification, and slips retention for record. In view of the extended application of EDI, e-commerce, cashless transactions, etc., business practices should be improved so that they can benefit both parties of an order (i.e., neither of them should be disadvantaged).

3.5 Development of the platform for trust chain

In cyber space, we need to check and secure reliability with countermeasures against unauthorized access by impersonators, disinformation (false information), etc., unlike transactions in a physical space. In addition, security measures should be taken in both cyber and physical spaces to respond to cyber-attacks targeting weakness in a supply chain. To make safe and efficient transactions available in cyber space, the platform for trust chain should be built, which enables the identification of corporate entities such as the confirmation of registration/financial data and the objective evaluations of the quality of their products/services, etc..

Under the theme of "Cyber-Physical Security for the IoT Society" as the second phase of the Strategic Innovation Program (SIP), the research & development of platform for trust chain to ensure security for the components (people, organizations, products/services, systems, data, etc.) including SMEs of a large-scale supply chain is in progress at the moment. In demonstration of the platform for trust chain, a wide range of bodies such as companies, governments, municipalities, and economic organizations are predicted to join and advance their efforts toward social implementation.

4. Potential of SMEs

As a transition from the pyramid-type industrial structure with large companies on its top to the horizontal networking-type progresses along with the oncoming evolution of digital transformation, transaction costs associated with human resources, funds, products/services, and technologies should decrease dramatically, regardless of the size of the company. SMEs will be able to flexibly procure management resources such as human resources, facilities, funds, and technologies from external markets and expand their sales networks around the world. Some SMEs have created new business opportunities by directly linking a number of consumers to suppliers with digital data, while other SMEs have already achieved unparalleled high-mix/low-volume/quick-delivery production through seamless digital data connections between in-house technologies and development/production processes.

The relation between large companies and SMEs is about to change significantly. SMEs that have achieved digital transformation in their own businesses by utilizing digital technologies and data are expected to lead and further accelerate the establishment of digital data flows through the entire supply chain as well as in the whole of society and industry.

¹³ The bill to partially amend the Act on Utilization of Information and Communications Technology in Administrative Procedures and other acts, in an effort to enhance convenience for the parties involved in

administrative procedures etc. and simplify and streamline administrative management through ICT utilization (Bill submitted by the Cabinet No. 47, 198th Diet session)